12-31-2010

How Loyal Are Your Users? Loyalty and Loyalty Outcome Behaviors: An Empirical Study in the Free/Libre Open Source Software Context

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ABSTRACT

The contemporary IS industry faces a challenge that is similar to brand proliferation in consumer products, that of identifying and nurturing loyal IS users. Also, there has been a growing interest in potential benefits that can be derived from loyal users' contributions to IS, such as word of mouth (WOM) marketing, non-verbal endorsement, resistance to counter-persuasion, and brand extension behaviors. To address the increasing competition and the growing interest in user contributions in the IS industry, this study proposes a conceptual model to examine the relationships between loyalty and habit and their antecedents (satisfaction and investment), and the relationships between loyalty and habit and their outcome behaviors (WOM, non-verbal endorsement, resistance to counter-persuasion, and brand extension) in the presence of a moderating factor (s). The proposed model will be empirically tested in the Free/Libre Open Source Software context as it is one of the driving forces for the increasing competition in the consumer software market and as Free/Libre Open Source Software ideology may potentially moderate the relationship between loyalty and its outcome behaviors.

Keywords

Free/Libre Open Source Software, Loyalty, Habit, Personalization, Word of Mouth, Non-Verbal Endorsement, Resistance to Counter-Persuasion, Brand Extension

INTRODUCTION

The contemporary IS industry faces a challenge that is similar to brand proliferation in consumer products, that of identifying and nurturing loyal IS uses. In the consumer software market, for example, there are multiple competing products in categories such as web browsers, multimedia players, image or audio editing software (Ye et al. 2008a). Likewise, there is an abundance of online service choices that the average consumer can choose from for any given service (e.g., travel agencies, portal websites, and ecommerce websites). In such markets, new features introduced by one provider are quickly duplicated by its rivals, and users are becoming more adept at switching between these standardized applications that provide with similar features and interface design. Subsequently, one provider's IS product or online service can be easily substituted with another's, e.g., replacing Internet Explorer (IE) with Mozilla's Firefox. Therefore, while users may benefit from having more choices, from an IS provider's perspective, it is becoming more difficult to retain existing users.

Furthermore, there has been a growing interest in potential benefits that can be derived from loyal users' contributions to IS, such as word of mouth (WOM) marketing, non-verbal endorsement, resistance to counter-persuasion, and brand extension behaviors. However, with a few exceptions (e.g. Kim and Son 2009), these loyalty outcome behaviors have been separately examined rather than together in a comprehensive nomological network that will enable us to better understand them in the presence of others. In addition, when users are loyal to a given IS product or online service, they are more likely to engage in loyalty outcome behaviors (Dick and Basu 1994), however it has not been clear if loyalty itself automatically leads to those loyalty outcome behaviors, or if the relationship is moderated by other factors. Identifying any potential moderators would be important for consumer software and online service providers, and thus this research also attempts to examine this issue.

Drawing upon the loyalty literature in consumer behavior research and the IS post-adoption literature, this study proposes a conceptual model to examine the relationships between loyalty and habit and their antecedents (satisfaction and investment), and the relationships between loyalty and habit and their outcome behaviors (WOM, non-verbal endorsement, resistance to

counter-persuasion, and brand extension) in the presence of a moderating factor(s). The proposed model will be empirically examined in the context of Free/Libre Open Source Software (FLOSS) as it is one of the driving forces for the increasing competition in the consumer software market (e.g., Firefox, OpenOffice, GIMP, Audacity, eMule, and Drupal), and as FLOSS ideology may potentially moderate the relationship between loyalty and its outcome behaviors. The proposed conceptual model and its theoretical background are described in the following section. In the third section, the research methodology that will be employed to empirically test the model is presented. Finally, the expected contributions of the proposed study are provided in the fourth section.

THEORETICAL BACKGROUNDS

IS Post-Adoption

Following the tradition of IS pre-adoption research, earlier IS post-adoption research was mostly focused on individuals' cognitive decision making processes, which involve various beliefs such as perceived ease of use and usefulness (e.g., Davis et al. 1989). Soon after, the research began to include a set of affective or emotional factors such as enjoyment (e.g., Thong et al. 2006), and provide some different approaches such as a feature centric perspective (Jasperson et al. 2005). However, most IS post-adoption research still views IS continuance as an extension of initial IS adoption behaviors, and thus mostly use the same constructs from pre-adoption research (Ye et al. 2008b). A notable exception is the recent research on the role of habit in a more stable IS post-adoption stage (e.g., Limayem et al. 2007). There is also an increasing interest in potential benefits that can be derived from loyal users' contributions to IS (e.g., Valck et al. 2009). For example, a recent study by Kim and Son (2009) called for attention towards loyalty outcome behaviors that transcends "mere continued IS usage". We draw on this stream of studies in IS post-adoption research to build our theoretical model.

Loyalty

Loyalty is one of the most studied constructs in consumer behavior research, and has recently gained increased attention from IS research due to its applicability in studying user behaviors such as switching among alternative technologies, online word of mouth (WOM) marketing, and contributing to online communities. Although the loyalty construct has been neither fully introduced nor as extensively discussed as it has been in consumer behavior research for many decades, it is not a totally alien term in IS research. For example, a number of researchers both in IS and consumer behavior research have applied the concept of loyalty to the e-commerce or online service contexts, and a new term, e-loyalty, has emerged from this research stream (e.g., Cyr 2008; Reichheld 2003). Another stream within IS research that probes users' IS continued use is IS post-adoption research (e.g., Bhattacherjee 2001; Jasperson et al. 2005; Karahanna et al. 1999). These studies have dealt with the phenomenon of loyalty for the past decade or so, although they have mainly focused on continuance intention in an organizational context. In the following section, we present our research model and hypotheses.

RESEARCH MODEL AND HYPOTHESES

The conceptual model starts its discussion from satisfaction (see Figure 1) since we are interested in the phenomenon that arises around loyalty rather than initial adoption. Therefore, we omit the constructs that we believe are dominant at the initial adoption stage such as perceived usefulness, perceived ease of use, or trust. The dashed circle indicates a factor(s) that may moderate the relationship between loyalty and its outcome behaviors, and are subject to be identified or created in particular contexts (Krishna and Rajan 2009). In the following sub-sections, main constructs and hypotheses of the proposed model are explained based on their theoretical backgrounds.

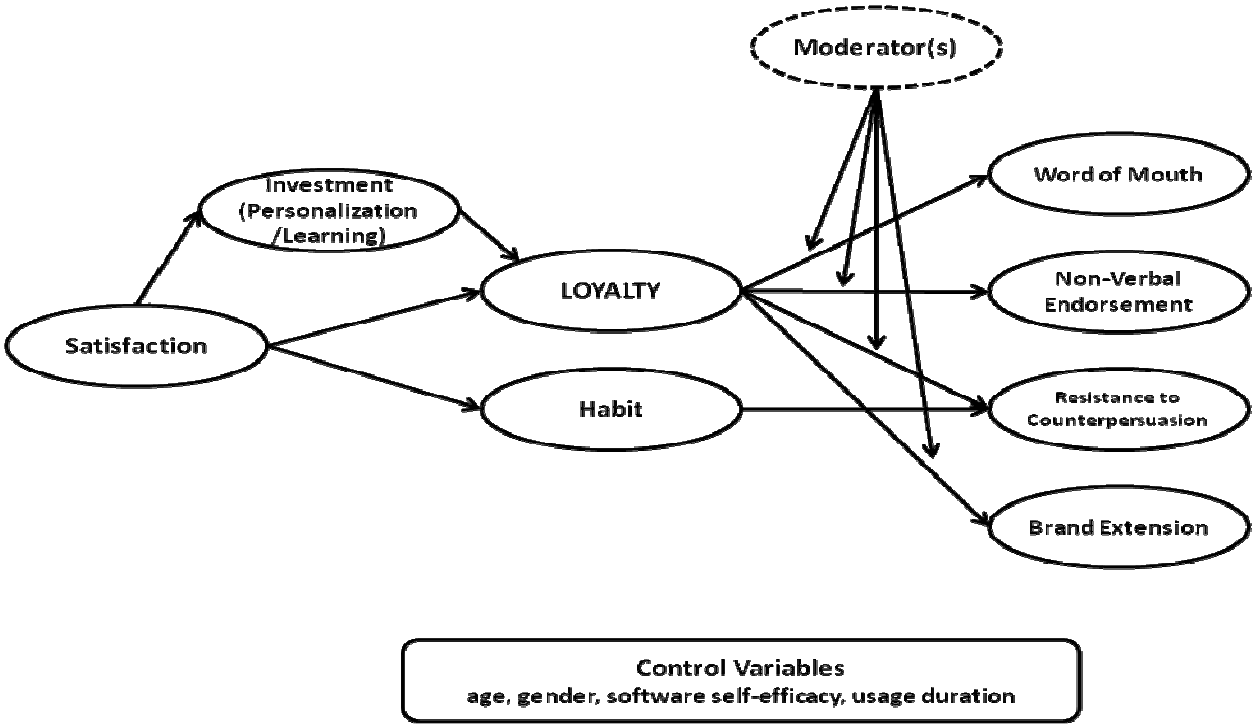

Figure 1. Research Model

Satisfaction

Satisfaction is defined as a construct that results from a user's overall cognitive and affective reflections on a given IS product or service (e.g., Oliver 1999). Satisfaction has been found to have a positive direct effect on loyalty in numerous consumer behaviors and IS post-adoption studies (e.g., Bhattacherjee 2001; Yang and Peterson 2004). We start our discussion by positing that satisfaction is an antecedent of loyalty and theorizing about the pathways through which a user can escalate from satisfaction to loyalty.

Hypothesis 1 (H1): *Satisfaction will have a positive effect on loyalty.*

The use of an IS product or online service often involves two types of investments (personalization and learning), on the part of the users. These investments have been widely examined in various contexts as one of the core constructs of both IS pre- and post-adoption research (e.g., Burnham et al. 2003; Chen and Hitt 2002; Yang and Peterson 2004). Drawing on a psychological process underlying a spillover effect (users tend to think they invested their time and effort because they like the IS product or service), some studies indicated that these investments would positively influence the formation of loyalty (e.g., Dick and Basu 1994; Kim and Son 2009; Thatcher and George 2004). It would be also reasonable to infer that users are more likely to invest in personalizing and learning more about their IS product or service if they have been more satisfied with it. Depending on the IS product or service, however, the users' investment in personalization or learning would be differentially or equally prominent in reinforcing their positive attitude towards it. For example, the users of a web browser (e.g., Firefox) are more likely to engage in personalizing the system (e.g., creating favorites and shortcuts) after their initial learning since such software involves more personalization than learning in nature, whereas the users of an office application are more likely to engage in learning the system (e.g., more functions) than personalizing it. Thus the construct may change depending on the context (e.g., personalization or learning only or both).

Hypothesis 2 (H2): *Satisfaction will have a positive effect on investment.*

Hypothesis 3 (H3): *Investment will have a positive effect on loyalty.*

IS post-adoption research increasingly employs habit as one of its critical constructs (e.g., Limayem et al. 2003; 2007; Wu and Kuo 2008), due to its potential to explain IS post-adoption related behaviors in stable contexts (Limayem et al. 2007). In general, habit has been found to be influenced by satisfactory experiences (Aarts et al. 1997). For example, after a new behavior is performed guided by a rational decision making process, the behavior tends to be repeated and reinforced as long

as it produces a satisfactory outcome (Verplanken and Orbell 2003). Also, as habit is defined in our study as "the extent to which people tend to perform behaviors (use IS) automatically because of learning (Limayem et al. 2007)," it can be also inferred that users who indicate higher level of habit in their use of IS products or services, they are more likely to indicate higher level of resistance to counterpersuasion for alternatives.

Hypothesis 4 (H4): *Satisfaction will have a positive effect on habit.*

Hypothesis 5 (H5): *Habit will have a positive effect on resistance to counterpersuasion.*

Loyalty and Its Outcome Behaviors

In earlier consumer behavior research, studies on loyalty was mostly focused on repeated purchase as a consequence of customer satisfaction (e.g., Brown 1952; Cunningham 1966; Tellis 1988), but later it has been extended to take account of various psychological factors such as emotional attachment that can drive more deeply held commitment that often results in other outcomes beyond mere repeated purchase (e.g., Oliver 1997; 1999). In this study, we take the very same view on loyalty as in recent consumer behavior research. Accordingly, loyalty in our study is defined as "an affective level construct that will affect its outcome behaviors (Kim and Son 2009)". An oft-quoted study by Dick and Basu (1994) in consumer behavior research proposed that loyalty spawns three types of outcome behaviors: 1) search motivation (as loyalty increases, search for information about alternative brands decreases), 2) resistance to counter-persuasion (as loyalty increases, resistance to counter-persuasion attempts also increases), and 3) WOM (loyalty increases, consumers are more likely to engage in WOM). Among them, WOM and resistance to counter-persuasion have been widely adopted in relevant studies. This may be due to a conceptual overlap between search motivation and resistance to counter-persuasion, and the fact that the latter indicates greater commitment while the former can be a result of other factors such as product involvement. We also adopt WOM and resistance to counter-persuasion as loyalty outcome behaviors since loyal IS users are also likely to engage in these loyalty outcome behaviors (Valck et al. 2009). In our study, WOM refers to a user's behavior to recommend the IS product or service to others, and resistance to counter-persuasion refers to a user's behavior to demonstrate resistance to persuasion attempts as they are commonly defined in other studies (e.g., Bendapudi and Berry 1997; Homburg and Giering 2001; Srinivasan et al. 2002).

In addition, we add two more constructs (i.e., non-verbal endorsement and brand extension) as other loyalty outcome behaviors that, to the best of our knowledge, have not been examined specifically in IS research. While the concept of endorsement is often interchangeably used with WOM to refer to users' active behaviors to provide positive recommendations to potential users, both in online and offline settings (e.g., Lim et al. 2006; Sia et al. 2009), non-verbal endorsement, in this study, is defined as users' behaviors to place a logo or banner of a certain IS product or service that they feel loyal to on their personal online media such as email, blog, or social networking site, etc. Although there is a conceptual overlap between WOM and the concept of non-verbal endorsement defined in this study, they differ by the media by which the positive recommendations are communicated. Also, WOM is a more explicit way of spreading the positive recommendations than non-verbal endorsement in terms of the strength of the message. Brand extension refers to users' intention to adopt new IS products or services offered by the provider that they feel loyal to, based on their prior favorable experiences from using their IS (Song et al. 2010). Many IS providers often provide more than one product or service. For example, Google launched a variety of other services (e.g., email, map) after the success of its search engine service. Likewise, Mozilla foundation launched Thunderbird after the success of its browser, Firefox. While users' actual adoption of the new IS may depend on other factors as well, it is reasonable to infer that they are more likely to consider adopting it over competing alternatives provided by other IS providers. Based on the above discussions, we propose the following hypotheses:

Hypothesis 6-9 (H6-9): L*oyalty towards an IS will have a positive effect on WOM, non-verbal endorsement, resistance to counter-persuasion, brand extension of the IS.*

A Moderator(s)

As previously mentioned, it has not been clear if loyalty itself automatically leads to those loyalty outcome behaviors, or if the relationship is moderated by other factors. For example, a user may feel loyal towards his/her IS product or online service, but may not engage in those behaviors. In the context of our study (i.e., FLOSS) we infer that ideology about FLOSS may positively moderate the relationship between loyalty and loyalty outcome behaviors. A stream of research in FLOSS has focused on identifying the motivations of developers and users who voluntarily participate in and contribute to FLOSS communities (e.g., Hars and Ou, 2001; von Krogh et al., 2003; Mockus et al., 2002; Oreg and Nov 2008). As a result, a variety of motivations have been identified such as reputation, learning, and altruism. Among them, the ideology associated with FLOSS has been widely recognized as a key in driving FLOSS contributions (Stewart and Gosain 2006). Numerous definitions of ideology have been proposed in various fields. Notably, Hamilton (1987) defines the term as: "a system of

collectively held normative and reputedly factual ideas and beliefs and attitudes advocating a particular pattern of social relationships and arrangements, and/or aimed at justifying a particular pattern of conduct, which its proponents seek to promote, realize, pursue or maintain."

Consistent with this definition (Hamilton 1987), FLOSS ideology is generally referred to as a shared notion that the source code should be freely available to the public to ensure "the users' freedom to run, copy, distribute, study, change, and improve" (Stallman 2009). Furthermore, ideology has been found to play a motivating role in reinforcing the individual's efforts towards a goal aligned with the ideology, indicating that a high level of ideology would result in higher commitment (Ke and Zhang 2009). Then, it is reasonable to infer that the users who are strongly driven by ideology are more likely to engage in loyalty outcome behaviors. While ideology can affect any of the stages in which the user makes a decision to adopt or continue to use FLOSS, we hypothesize that users who have relatively stronger ideology towards FLOSS are more likely to engage in loyalty outcome behaviors:

> Hypothesis 10a-d (H10a-d): *Ideology about FLOSS positively moderates the relationship between loyalty and loyalty outcome behaviors.*

Control Variables

Some widely adopted demographic control variables in IS pre- and post-adoption research such as age and gender are incorporated into the proposed model to eliminate any potential bias that may be caused by these factors (e.g., Venkatesh et al. 2003). Similarly, software self-efficacy (e.g., Jasperson et al. 2005) and usage duration (Szajna, 1996) are also known to play a significant role in regulating IS post-adoption phenomena (Kim and Son 2009). The significance of these variables could be even greater in the context of our study considering that the model includes habit and personalization; thus their moderating effects are also taken into account in our model.

RESEARCH METHODOLOGY

Research Setting

Firefox users were chosen as a specific empirical setting for this study due to the following reasons. First, as previously mentioned, it is FLOSS that is one of the driving forces for the increasing competition in the consumer software market. Second, there exist other alternative web browsers that generate competition in the market (e.g., IE, Safari, Opera, Flock), and third, they all provide similar features and user-interfaces, which lowers switching costs for users and thus makes loyalty more critical. Fourth, it has been one of the most popular FLOSS and renowned for successfully driving various types of user contributions such as community-led marketing (e.g., Spreadfirefox.com). Finally, it is a web browser that people frequently use, and it also provides various personalization features as other web browsers often do. These characteristics offer us a desirable setting to examine the constructs such as habit and personalization. Taken together, we believe that Firefox users provide an ideal environment for examining the efficacy of the model. Figure 2 shows our research model that is specific to FLOSS (i.e., Firefox users).

Data Collection and Measures

The proposed model will be empirically examined at the individual level using data from a web-based survey of Firefox users who have been using Firefox on a voluntary basis. The initial version of the questionnaire has been developed by generating new items or adapting existing items that have been empirically proven to be reliable and valid in previous studies. The appendix shows the items for each construct. After ensuring its overall face, content, and discriminant validity, the link to the finalized questionnaire will be distributed, via email, to students in the authors' institution. The data obtained will be analyzed by applying partial least squares (PLS) (Chin 1998) using SmartPLS 2.0. due to its exploratory nature (i.e., moderating effects).

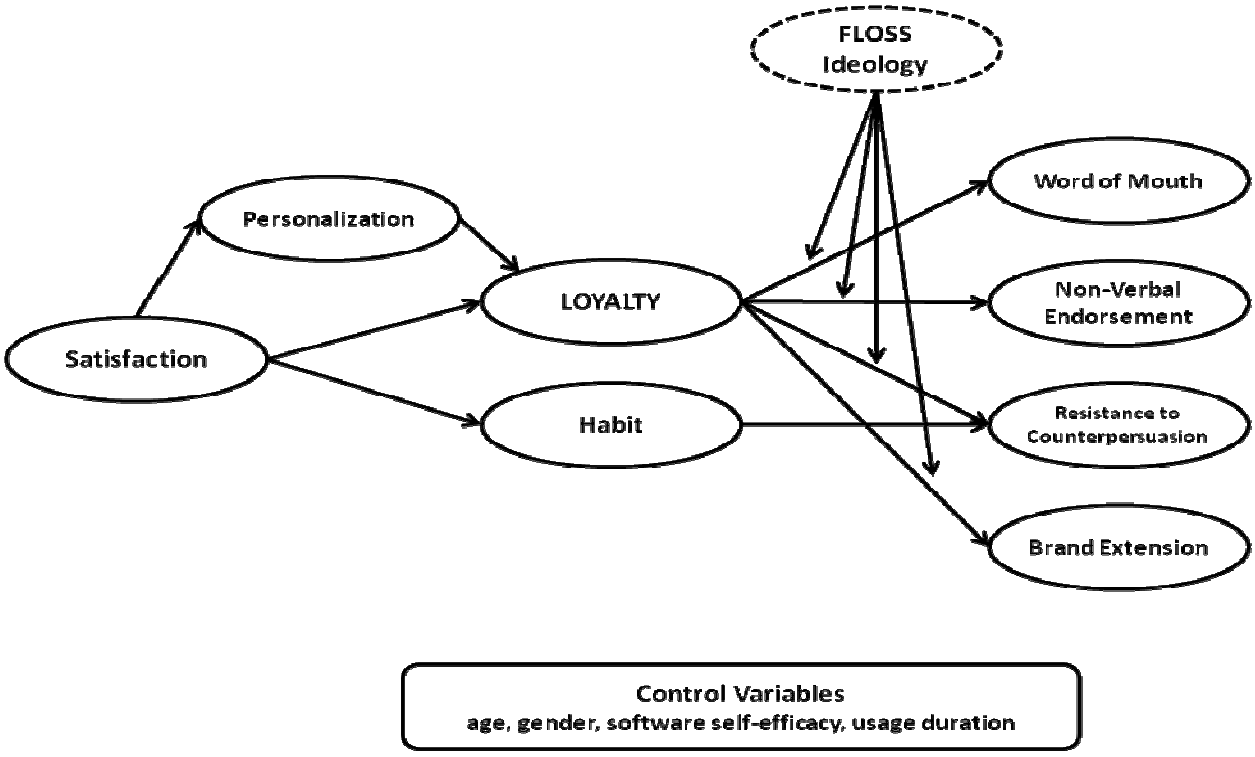

Figure 2. Research Model for FLOSS (i.e., Firefox)

EXPECTED CONTRIBUTIONS

The expected contributions of this study to IS research are three-fold. The proposed model is conceptualized using the constructs such as habit, investment (i.e., personalization or learning), and loyalty rather than the same constructs from pre-adoption research. Second, this study examines the relationship between loyalty and its outcome behaviors, which has been largely ignored in IS research in general and IS post-adoption research in particular. We also include non-verbal endorsement and brand extension that, to the best of our knowledge, have not been examined in IS research. Finally, given the increasing competition and the growing importance of user contributions in the IS industry, we argue that identifying factors that may moderate the relationship between loyalty and its outcome behaviors has become an issue of great significance to IS research and the proposed model facilitates the exploration of such moderators in the FLOSS context.

It can also provide some insights for practitioners who provide IS products or services that are becoming increasingly substitutable and thus seek ways to retain their users. The recent increase in providing more personalization features among IS providers may reflect this notion. For example, Firefox recently launched a new campaign that promotes its superior personalizability (as compared to other web browsers): "There are literally thousands of totally free ways to adapt your Firefox to fit exactly what you like to do online" (Mozilla foundation, 2010). Most importantly, our IS loyalty model suggests that the IS providers who seek their loyal users' active contributions may contemplate identifying the factors that may moderate the relationship between loyalty and its outcome behaviors. For example, as previously discussed, FLOSS ideology is likely to reinforce the relationship. This indicates that FLOSS communities may develop strategies that are aimed at increasing their users' awareness of FLOSS ideology.

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APPENDIX: MEASURES*

Construct	Measures	Sources
Satisfaction	How do you feel about your overall experience of using Firefox: • Very dissatisfied . . . Very satisfied • Very displeased . . . Very pleased • Very frustrated . . . Very contented • Absolutely terrible . . . Absolutely delighted • Overall, I am satisfied with the quality of Firefox • What I get from using Firefox meets what I expect from a web browser.	Bhattacherjee 2001; 2008; Hsu et al. 2004; Kim and Son 2009
Investment (Personalization)	• I "set up" Firefox to use it the way I want to. • I have put effort into adapting Firefox to meet my needs. • My Firefox is personalized in some way. • I have used features offered by Firefox to suit my style of web browser use.	Burnham 2003; Kim and Son 2009

Habit	• Using Firefox has become automatic to me. • Using Firefox is natural to me. • When faced with a particular task, using Firefox is an obvious choice for me. • I use Firefox automatically, when I need to use a web browser. • I start using Firefox before I realize I'm using it.	Limayem et al. 2003; 2007; Verplanken and Orbell 2003; Wu and Kuo 2008
Loyalty	• I consider myself to be loyal to Firefox. • I feel loyal towards Firefox. • It means a lot to me to continue to use Firefox. • My loyalty for Firefox would not willingly change.	Kim and Son 2009
Word of Mouth	• I would say positive things about Firefox to other people. • I would recommend Firefox to anyone who seeks my advice. • I would refer my acquaintances to Firefox. • I would talk to others about the benefits of switching to Firefox.	Kim and Son 2009; Roy et al. 2009; Srinivasan et al. 2002
Word of Logos	• I would put Firefox logo or banner on my email. • I would like to wear clothing with the logo or banner of Firefox on it. • I would put Firefox logo or banner on my blog. • I would put Firefox logo or banner on my social networking site(s).	N/A
Resistance to Counter-Persuasion	• I seldom consider switching to another web browser. • I do not foresee myself switching to other web browsers. • Even if close friends recommended another web browser, I do not think I would change my commitment to Firefox. • To change my commitment to Firefox would require major rethinking.	Kim and Son 2009; Luarn and Lin 2003
Brand Extension	• I would try new or other products (e.g., Thunderbird) from Mozilla foundation that creates Firefox.	Aaker and Keller 1990.
Ideology	• I understand the general philosophy and value of OSS movement (Y/N). • I consider myself as an advocate for the OSS movement. • I believe the OSS movement greatly benefits our society. • I believe source code should be freely shared.	Ke and Zhang 2009; Stewart and Gosain 2006
Aesthetic Design	• I think the graphical design of Firefox is attractive. • I think Firefox is aesthetic. • I think the graphical design of Firefox shows creativity. • I think Firefox is stylish. • I think Firefox is visually appealing.	Johnson et al. 2006
Control Variables	**Measures**	
Age	Years Old	N/A
Software Self-Efficacy	• I can use Firefox even if there is no one around to help me. • Software manuals or online help for reference are enough for me to use Firefox. • I am confident in my ability to use Firefox.	Bhattacherjee 2008; Hsu et al. 2004; Venkatesh et al. 2003
Gender	1 : male; 2 : female	N/A
Usage Duration	How long have you been using Firefox? (years)	Szajna, 1996

**1: Strongly Disagree; 7: Strongly Agree, unless otherwise noted.*